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Indian Standard

SPECIFICATION FOR EXOTHERMIC FEEDING AID FOR FOUNDRY

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR EXOTHERMIC FEEDING AID FOR FOUNDRY

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Indian Standard

SPECIFICATION FOR EXOTHERMIC FEEDING AID FOR FOUNDRY

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 21 February 1983, after the draft finalized by the Foundry Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Exothermic feeding aids are based on alumino-thermic reaction and are manufactured from wide ranges of proprietory compositions using mainly oxides of iron, aluminium filing and chemical oxidizing agents.

0.3 The material is used to improve riser efficiency in steel and iron castings through direct heat input by exothermic reaction and yield of liquid metal. Insulation characteristics of the material is of prime importance.

0.4 The requirements of exothermic feeding aids covered in this standard are mainly based on grey or white iron. The studies for the requirement of exothermic feeding aids for steel are under way, which shall subsequently be incorporated during further revision of this standard.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the quality requirements for exothermic feeding aids for foundry.

2. SUPPLY OF MATERIAL

2.1 General requirements relating to the supply of exothermic feeding aids for foundry shall be as laid down in IS : 1387-1967†.

*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

3. REQUIREMENTS

3.1 The material shall be in dry powdery form, free from lumps or the like.

3.2 Metal yield of the exothermic feeding aid, when tested in accordance with the procedure mentioned in Appendix A shall not be less than 35·0 percent.

3.3 During use of the material as per the manufacturer's recommended rate of addition, it shall burn uniformly. The material shall not explode or give rise to sudden eruption followed by instantaneous burning of the total material.

3.4 As per the manufacturer's recommended rate of addition in the riser, the riser top shall be fully covered by the slag crust produced by the reaction.

4. PHYSICAL CHANGES ON THE TEST CASTING

4.1 The material shall comply with the requirements given in Table 1, when tested in accordance with the method given in Appendix B.

TABLE 1 REQUIREMENTS OF EXOTHERMIC FEEDING AID FOR USE IN FOUNDRIES

(*Clauses* 4.1 *and* B-2.1)

Sl No.	Characteristic	Requirement
(1)	(2)	(3)
i)	Ignition time	50 seconds maximum for iron 60 seconds maximum for steel
ii)	Temperature drop before reaction starts, as indicated by thermocouple T/C-1	20°C, *Max*
iii)	Effective rise over maximum temperature as indicated by thermocouple T/C-1	50°C, *Min*
iv)	Time to reach maximum temperature after addition as indicated by thermocouple T/C-1	3 minutes, *Max*
v)	Rate of cooling up to 1 150°C as indicated by top thermocouple T/C-1	12° per minute, *Max*
vi)	Rate of cooling up to 1 150°C as indicated by bottom temperature T/C- 2	8° per minute, *Max*

5. PACKING

5.1 The material shall be packed in polyethylene lined gunny bag. Quantity to be packed per bag shall be as agreed upon by the manufacturer and the purchaser.

6. SHELF LIFE

6.1 When stored as recommended by the supplier the material shall not fail to meet the requirements as given in **3** and **4** within the stipulated shelf life period.

7. SAMPLING

7.1 Representative samples shall be drawn as per mutual agreement between the manufacturer and the purchaser.

8. MARKING

8.1 Each bag shall be marked with the manufacturer's name, brand name of material, date of manufacture and date of expiry.

8.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clause* 3.2)

TEST PROCEDURE FOR EVALUATING METAL YIELD OF EXOTHERMIC FEEDING AID FOR FOUNDRIES

A-1. TESTING PROCEDURE

A-1.1 A representative sample weighing 200 g shall be taken in a core (made by oil sand or CO_2 process) having approximately 100 mm dia × 125 mm cavity. The top surface of the material shall then be lighted by a sparkler or oxy-accetylene flame. The reaction shall start spontaneously and shall be over, leaving a crust of slag on top. It shall then be

allowed to cool for complete solidification and then quenched in water to separate out the slag from the metallic bead. After drying, the bead shall be weighed and percentage yield shall be calculated as given below:

$$\text{Percentage yield} = \frac{\text{Weight of the metallic bead}}{\text{Original weight of the material}} \times 100$$

NOTE 1 — Care shall be taken to avoid splashing out of the material during reaction.

NOTE 2 — The test shall be repeated thrice and the result be reported based on the average of three results.

NOTE 3 — The core shall not crack or give way before the metal is completely solidified.

APPENDIX B

(*Clause* 4.1)

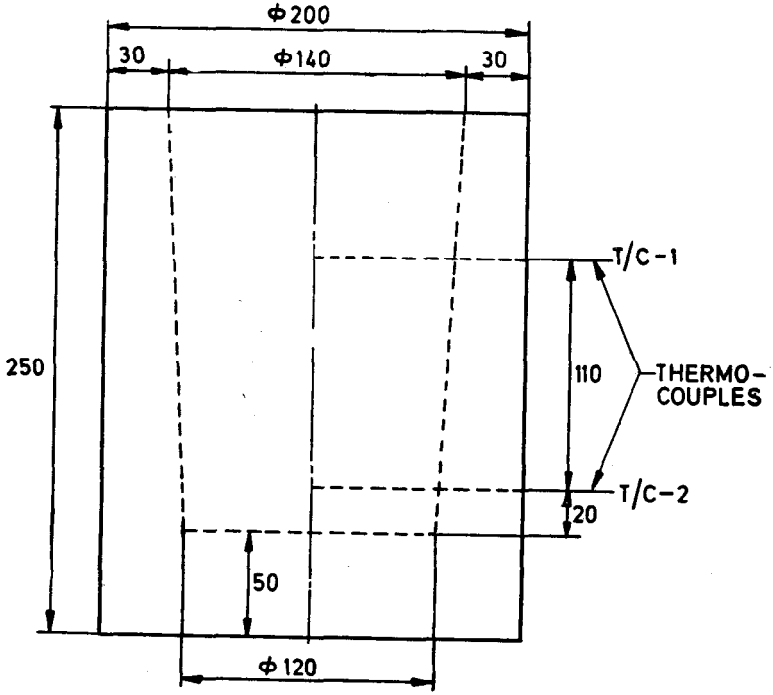
TEST PROCEDURE FOR EVALUATING PHYSICAL CHANGES ON THE TEST CASTING FOR EXOTHERMIC FEEDING AID FOR FOUNDRIES

B-1. TESTING PROCEDURE

B-1.1 Apparatus

B-1.1.1 A mould as per Fig. 1 shall be made either by silicate/CO_2 or oil sand process.

B-1.1.2 The thermocouples (Pt, Pt—Rh.) with silica protection sheath shall be placed as indicated in the figure and be connected to a suitable temperature indicator/recorder.



All dimensions in millimetres.

FIG. 1 TEST MOULDS FOR THE STUDY OF FEEDING AIDS

B-1.2 Procedure

B-1.2.1 Liquid metal (grey/white iron) having a temperature between 1 400 to 1 440°C shall then be poured in the cavity and filled up to 10-15 mm above the thermocouple. Immediately after the top thermocouple attains maximum temperature, 1·25 kg of exothermic powder shall be added on top of the liquid metal and temperature from both the recorder shall be noted at 15 seconds interval.

B-2. RESULT PRESENTATION

B-2.1 Temperature recorded by both the thermocouples shall then be plotted against time and the data be recorded and compared with Table 1.

NOTE — To avoid mould failure during the study the assembly shall be placed within an empty mould box and sides shall be filled up by green sand.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2